

NESTING ECOLOGY AND HABITAT OF THE NORTHERN GOSHAWK
IN UNDISTURBED AND TIMBER HARVEST AREAS
ON THE TARGHEE NATIONAL FOREST,
GREATER YELLOWSTONE ECOSYSTEM

by

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predation pressures. Woodbridge and Detrich (1994) described their study area as intensively harvested and fragmented, with goshawks nesting in the remaining patches of mature forest. This type of harvesting would reduce and concentrate the total number of potential nest trees so goshawks might be forced to reoccupy the same nests more frequently. Although habitat fragmentation and concentration of nest clusters would appear to result in higher predation pressure compared to less fragmented areas, such habitat changes might actually reduce or eliminate interior forest mammals in the family Mustelidae that have been reported to prey on nesting goshawks such as pine marten (this study), fisher (*Martes pennanti*) (Erdman 1993) and wolverine (*Gulo gulo*) (Doyle and Smith 1994). Studies of nest box use by owls in Sweden showed that martens have spatial memory of nest locations and will predate boxes left in the same location in consecutive years (Sonerud 1985). Goshawks nesting in intact forests may switch nests not only because they have more choices for alternate nest sites, but also to avoid mammalian predators.

Goshawk prey

Goshawks are opportunistic foragers, preying upon a variety of different bird and mammal species (Reynolds 1992, Doyle and Smith 1994). On the TNF, however, over 72% of prey biomass consisted of four species: snowshoe hare, Unita ground squirrel, Ruffed Grouse and Blue Grouse (Table 9), and one male goshawk during the nestling period fed almost exclusively on ground squirrels. Decreases in the populations of these primary prey species due to natural cycles or man-caused disturbances may well explain some of the fluctuations observed in productivity and occupancy at breeding territories (Doyle and Smith 1994). In Finland, goshawk clutch size correlated with density of four tetraonid species which peaked every 6-7 years (Sulkava et al. 1995). Population databases on local prey species are not maintained by the Idaho Department of Fish and Game (Jeff Copeland, Non-game biologist, Idaho Dept. of Fish and Game, pers. comm.), however, so I could not correlate annual goshawk population fluctuations with prey cycles.

control programs in newly planted areas on the TNF also reduce numbers in areas where they may be most prolific (Barnes et al. 1985). Most of the important goshawk prey items identified on the TNF (based on biomass or number) except for ground squirrels are associated with forest habitat: snowshoe hare, Ruffed Grouse, Blue Grouse, red squirrel, and Northern Flicker (Reynolds et al. 1992). From what I could determine through visual inspections of clear cut areas and discussions with Forest Service personnel, ground squirrels do not appear to move into harvested units in any noticeable numbers on the TNF even when replanting efforts fail and such units remain open for extended periods of time. Even if prey populations do increase in clear-cut units, the lack of certain habitat features, such as perches or adequate cover, may preclude foraging in such areas by goshawks (Widén 1994). Also, after such units regenerate into densely spaced, even-aged stands, they likely provide little opportunity for foraging goshawks for decades.

The only study that attempted to measure effects of timber harvesting on goshawk reproduction occurred in ponderosa pine and mixed conifer habitat in Northern Arizona (Crocker-Bedford 1990). This study reported a substantial decrease both in occupancy and productivity in post-harvest territories in 1987 even if nest buffers up to 500 acres were retained around known nests. Reduction in prey populations, competition for nest sites by more open country raptors, and predation by Great Horned Owls were suggested as possible factors affecting goshawk reproductive success. Crocker-Bedford (1995) reanalyzed this data set to compare rates of goshawk occupancy and nestling production from 1987 to the amount of harvesting that had taken place between 1973 and 1986 within home range areas of 2290 ha (2.7 kilometer radius circular area) around the center of nest clusters. Both occupancy and productivity appeared to be inversely related to the amount of harvesting that had taken place within the home range area. Territories were grouped into four categories: 1) little or no harvesting (n=12); 2) 10-39% of home range harvested (n=14); 3) 40-69% harvested (n=16), and 4) 70-90% harvested. For these categories occupancy rates in 1987 were 83%, 43%, 31% and 9%, and productivity rates were 1.67, 0.86, 0.31 and 0.00 respectively (Crocker-Bedford 1995).

In comparison, on the TNF, I found no difference in mean productivity between pre- and post-harvest territories, and a smaller reduction in occupancy in the post-harvest

55%
squirrel

increase
in RVP
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TABLE 9. Goshawk prey species, Targhee NF, 1989-1993: See Appendix G for scientific names and weights used to calculate biomass.

COMMON NAME	Number of Prey Items				Percent of Total Biomass %
	PELLETS or PREY REMAINS	BLIND OBSERVATIONS	Sub-total Birds or Mammals		
	n	n	n	%	
BIRDS					
Ruffed Grouse	16		16	18.8%	13.3%
Blue Grouse	5		5	5.9%	7.5%
Grouse, sp.		6	6	7.1%	7.0%
Bird (medium), unidentified	5	21	26	30.6%	3.8%
Common Raven	2		2	2.4%	2.5%
Nothorn Flicker	7	1	8	9.4%	1.6%
Cooper's Hawk	3		3	3.5%	1.9%
Long-eared Owl	2		2	2.4%	0.8%
Boreal Owl	1		1	1.2%	0.5%
American Robin	2	2	4	4.7%	0.5%
Clark's Nutcracker	1	1	2	2.4%	0.4%
Duckling, sp.		2	2	2.4%	0.3%
Steller's Jay	2		2	2.4%	0.3%
Gray Jay		1	1	1.2%	0.1%
Woodpecker, sp.		1	1	1.2%	0.1%
Red-naped Sapsucker	1		1	1.2%	0.1%
Townsend's Solitaire	1	1	2	2.4%	0.1%
Williamson's Sapsucker	1		1	1.2%	0.1%
TOTAL BIRDS	49	36	85	100.0%	41%
MAMMALS					
Snowshoe Hare	11	2	13	12.9%	30.0%
Unita Ground squirrel	1	41	42	41.6%	14.9%
Red Squirrel	14	4	18	17.8%	5.1%
Medium mammal, unidentified		10	10	9.9%	3.2%
Marmot	1		1	1.0%	2.6%
Nuttall's Cottontail	2		2	2.0%	1.4%
Pocket Gopher	5		5	5.0%	0.9%
Long-tailed Weasel	2		2	2.0%	0.5%
Vole,sp.	4		4	4.0%	0.2%
Northern Flying Squirrel	1		1	1.0%	0.2%
Yellow Pine Chipmunk	1		1	1.0%	0.1%
Small rodent, unidentified	2		2	2.0%	0.1%
TOTAL MAMMALS	44	57	101	100.0%	59%
TOTAL NUMBER : all prey items	93	93	186		
PERCENT BIRDS	52.7%	38.7%	45.7%		
PERCENT MAMMALS	47.3%	61.3%	54.3%		